

RAILBRICKSTM

BRICK RAILROADING MAGAZINE



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- *More "PF Trains to the Limit"*
- *An Accidental Gathering at Brickworld Chicago*
- *2014 LEGO City Set Reviews!*



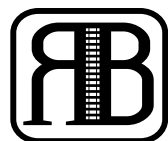
STREETCAR

BY MILTON TRAIN WORKS

**Instructions available on our
MTW-9001-pas CD**



Render by Jeroen de Haan



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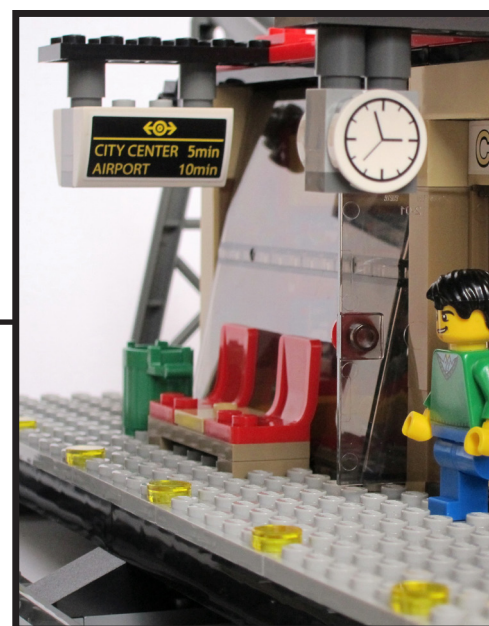
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ALL ABOARD!

Fifty years ago, the famous Linn Westcott wrote about table heights in his editorial for the June 1964 issue of *Model Railroader*. He described a layout in Connecticut that had its benchwork only one foot off the floor. He talked about layouts at eye-level, waist level, and those in between. His point was that a change of position, in this case table-height, could change the perspective of the viewer and builder.



In the past couple of years, my home LUG has experimented with using different table heights for a couple of our public shows. The results were interesting. For us, the builders, it offered a new challenge; a new way to look at our designs. Track no longer fit the comfortable flat geometry that it was designed for. Some of our locomotives, we found, were not powerful enough for climbing grades, or, in some cases, too heavy to descend a slope without picking up frightening amounts of speed. For the viewing public, the simple change in elevations made our layout seem larger than it had been previously, even though our overall footprint hadn't changed. By raising a couple of tables on one corner of our layout, our "town" was transformed into a mountain village. Adults could see, eye level, along the streets, forcing them into a "minifig view" of the adjacent buildings. On the opposite side of the layout where our tables were at our standard waist level, adults had a bird's-eye view of the train yard, giving them an overview of the operations area.

Our change of perspective was not always good. We found that children had more difficulty viewing the entire layout. We had more trouble controlling our trains, at least until we learned some new tricks for slowing them down when necessary. Like all changes, it took some effort, and it was an evolving process that we had to work through. Even more interesting is that the next year, when we had fewer "high" tables, visitors were disappointed that our layout was "not as big as last year". We had inadvertently changed our visitor's view of how big our layout was, though, again, we had filled the same amount of floor space.

Over the past few months, I've had several discussions with various LEGO train fans about the changing perspective of our hobby. Are layouts less important at large events these days? Is the public less excited by what they see? Or is it the opposite? Has our niche hobby become mainstream enough that people expect more? Does the type of event change how our displays are viewed? Do we see ourselves as LEGO fans who build trains, or train fans who build with LEGO? Our hobby is in a unique position in that we straddle two other hobbies. When displaying at train shows, we get to show our love of The Brick. When displaying at LEGO conventions, we get to show just how cool trains are.

My perspective? It's a great place to be.

-Elroy

Instructions, Challenges, and Tips & Tricks have been categorized into the following levels:



Beginner



Intermediate



Advanced

Have an idea for RAILBRICKS?

Submit by August 8th, 2014 for inclusion in the next issue!

Who may submit an article?

You!

People submitting articles do not need to be professional level writers. RAILBRICKS is a magazine for fans, by fans. We welcome articles from enthusiasts who build, collect, and play with LEGO® trains.

What sort of articles may be submitted?

We welcome how-to articles, event reports, building instructions and more. If you're not sure if your article or story would be a good fit, email the idea to editor@railbricks.com for input.

How long should articles be?

In general articles should be between 750 to 3,000 words in length, and include any photographs or images that will accompany the text.

Longer articles may be published in parts in following issues.

How should articles be prepared?

Articles should be typed in either a text document or e-mail, and should use proper grammar, punctuation, and spelling.

How should images be prepared?

Images should be submitted as separate attachments. High resolution images of 300 DPI are preferred as they will reproduce better than lower resolution images.

How are articles submitted?

Completed articles may be e-mailed to editor@railbricks.com. The text of the article may either be in the body of the e-mail, or added as a file attachment.

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The author on the real Stadler FLIRT EMU.

The Stadler Saga

by Donát Raáb

History

The Hungarian State Railway (Magyar Államvasutak or MÁV) bought 60 Stadler FLIRT (Fast Light Innovative Regional Train) electric motor units from the Stadler railway vehicle manufacturer in 2006. After the first red FLIRTs had started operating on Railway Line 1, where I live, I felt that these trains should be built from LEGO® bricks. After several attempts, I finished my first LEGO FLIRT in February 2010. My very first train was displayed for two weeks that year in a shopping center. Fortunately, one of Stadler Trains Hungary Ltd.'s staff members visited this display. The company ordered a LEGO FLIRT from me, to be built and set up in their office (Fig. 1). As a reward, I could also order bricks to build a second FLIRT for myself.

In 2011 Viktor Kovács (known as kvp) introduced his solution for building longer train vehicles with Jacobs-bogies. These long trains are still able to run on standard LEGO train track geometry. I rebuilt my FLIRT in a new scale, using the parts received from the previous builds. In 2013 Hungarian State Railway ordered 42 more FLIRTs with different coloring. When the design was finalized, I started to order bricks, and I finished the new train even before the real one was produced. Having all the pieces I needed, it took 12 hours to put the 3,500 pieces of LEGO-bricks together, including electric parts (Fig. 2). In the following days I made slight changes on the train.



Figure 1: The first version of my red Stadler FLIRT under construction. The entire side of the train was built in SNOT.

Figure 2: Last step after 12 hours of continuous building.





Figure 3: The new LEGO-FLIRT at its first public display.

The new LEGO train was introduced with its real brother at an official ceremony organised by Hungarian State Railway and Stadler on the 19th of March, 2014 (Fig. 3). Before the event Stadler Trains Hungary Ltd. asked me to build two more LEGO-FLIRTs for them — one with the new blue/white/yellow/grey color scheme, and another with

yellow/green coloring. Real trains in this coloring were delivered to the GySEV/Raaberbahn railway company (Fig. 4). In addition to the new models, the company wants its old red engine to be upgraded to the new scale. As a reward, I will have my own GySEV-FLIRT, raising the number of LEGO-FLIRTs in Hungary to six.



Figure 4: LDD-plan for the GySEV-FLIRT.



Figure 5: My two Stadler FLIRTs on long radius curve built from straight tracks¹.

The LEGO Stadler FLIRT

Each LEGO Stadler FLIRT consists of approximately 3,500 LEGO bricks; the exact number depends on the colouring pattern. The trains have four sections. The two with the driver's cabins are longer, and the two middle sections, containing the water closet block, are shorter. The LEGO-FLIRTs are driven with four motors because of their weight (one unit weighs 3.5 kilograms). Two 9V train motors are placed beneath the driver's cabin, and one PF train motor is attached to each 9V train motor as bogies 2 and 4. The third middle bogie is not driven. Simple LEGO magnets are attached to the 9V train motor bogies. With these parts the LEGO-FLIRTs can be easily coupled together (Fig. 5).

The trains also have front, tail and interior lights powered by a LEGO rechargeable battery box via an IR receiver. I put modified PF-LEDs² on the blue output of the receiver for the front and tail lights, and original unmodified LEDs on the red output as interior lights. The modified LEDs don't light up simultaneously. Depending on polarity, only one of the pair will light. The front and tail lights can be turned off manually with PF polarity switches that are placed on the roof. When coupling two FLIRTs no lights are needed between the two units. Three pairs of modified LEDs are applied to the end sections of the train and each section has one pair of unmodified LEDs as interior lights. All the electric parts are connected with PF extension cables. Interiors of the cars are detailed; the arrangement of the seats, coloring of the floor and the walls inside follow the real train (Fig. 6).

I have a lot to do in the next few months; ordering bricks, building three new trains, and upgrading the red Stadler. After this order I might try to build a Westbahn or Moscow Stadler KISS. If you need detailed information of the trains or LDD-files, or you want to share your thoughts with me, please contact me at ashivalkoinen@gmail.com.

Acknowledgements

I would like to thank all the members of the LEGO community for the tips and critiques I received in these last four years. Also great thanks to RAILBRICKS for publishing this article.

¹ Holger Matthes, 2007: Smooth Curves without cutting corners, RAILBRICKS #1, pp. 32.

² Viktor Kovacs, 2011: Power Function Signal Lights, RAILBRICKS #9, pp. 21. 



Figure 6: Interior of LEGO and real FLIRTs.





The “D” Layout

– An Introduction to the
World of 4.5 Volts

By Phillip Marmorino

In the train layouts that populate the RAILBRICKS community, we almost exclusively see the 9V and 12V systems. However, there is one more voltage of LEGO® train: 4.5 volts. Why has the 4.5V system been neglected? It may be due to the restrictive battery wagon, which spells big trouble for 8-wide builders due to its small length, or it could be the large motors that make low-floor cars difficult to build. The rest of the system is very nice and has a few advantages over the conventional 9V system. I’ve found great potential in the 4.5V system and, above all, an easy way to make wide radius curves (grand curves) with a radius of around 100 studs. This article will give you a basic understanding of the 4.5V system and its history.



A Brief History of 4.5 Volt Trains

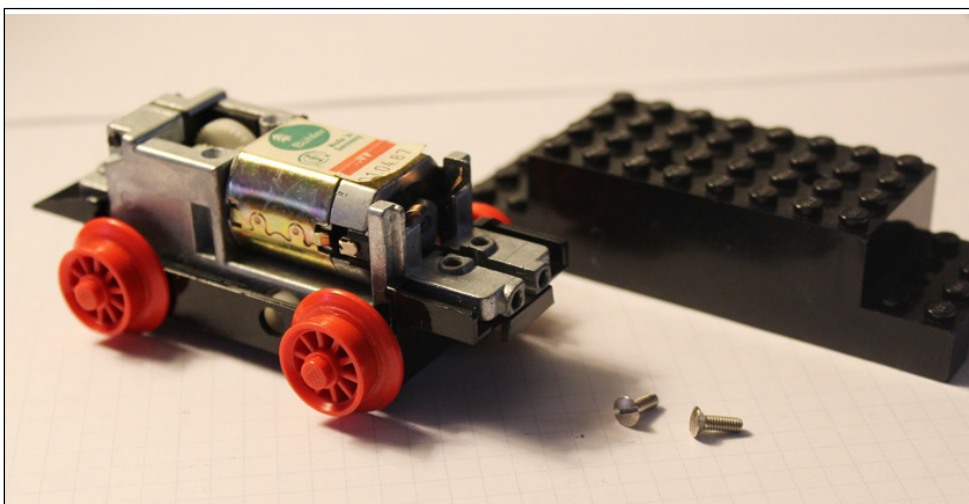
In 1966 the first proper LEGO train engines were made. Before then, crude carpet-running trains could be made with the standard wheels of the time. 1966 brought battery packs, motors, flanged wheels, and train track for the very first time. These engines had a large battery box, 6 x 12 x 3 studs, which had to be incorporated into the design of the locomotive. Available in blue and black, this battery box made it hard to build 6-wide engines. In 1970, LEGO switched to a battery wagon, pictured above.

This battery made it much easier to power trains because it was a wagon instead of a box. It also came in many colors, unlike the old battery boxes. Owing to its success, several 4.5-volt train sets hit the shops during the remainder of the Blue Era.

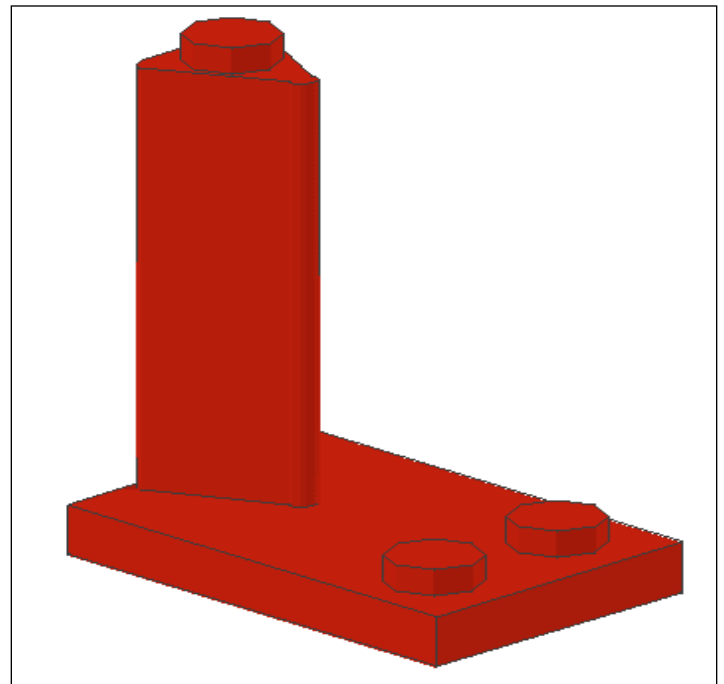
During the late 1970s, trains took a back seat to other themes such as the Homemaker sets. In 1980, the start of the Gray Era, 12V trains were the new big thing. Unfortunately, big things have a big price tag, so 4.5V trains were re-released as a cheaper alternative to the 12V system. Aside from having gray tracks with snap-on ties and the minifigure, nothing was changed from the 1970 system. Of course, the design of the trains was improved, thanks to the greater part selection. Two starter sets were made: the 7722 and the 7720. Both had small, non-articulated locomotives pulling three 2-axle cars. Several trackside structures compatible with the 4.5V system were made to accompany the two starter sets, including a level crossing and two train stations.

Technical Aspects of the 4.5-Volt System

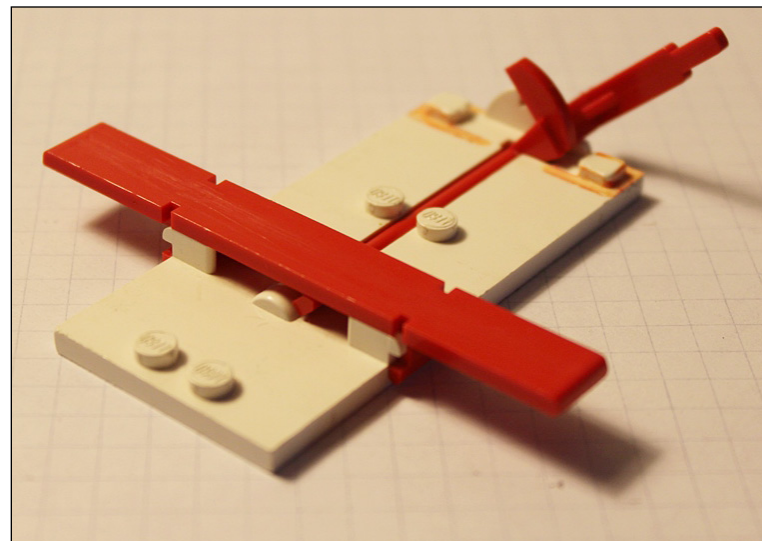
4.5V motors are large compared to the classic 9V and 12V, but are stronger. The red wheels have metal axles. Any of the old wheels with studs on the side may be put into the sockets. Additionally, between the two wheels there is an axle-hole where any Technic axle may be inserted. Unscrewing the top, it is seen that the motor is the same size as that of the 12V system. This lets you switch the motor for different voltages. The 4.5V motors are more useful for steam engines than diesels or electric engines because it's a tad too tall to make rotatable boogies. My 0-6-2 steamer uses two motors close together with large drivers at the Technic axle holes. The holes for steel axles are unused. Owners of PF train motors know that putting large drivers on the motor reduces the power of the train significantly, but two 4.5V motors have no problem.



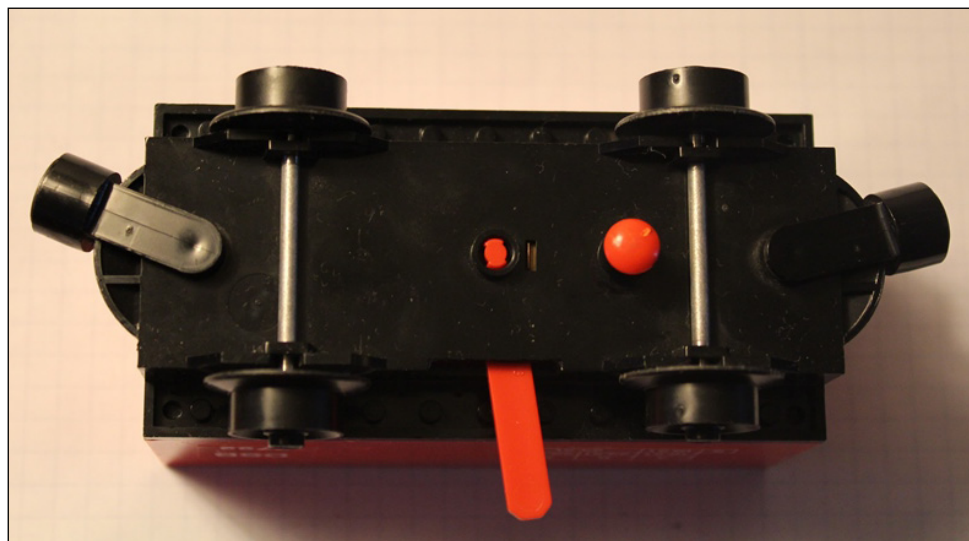
Unlike the 9V and PF motors, a 4.5-volt motor has 5 possible points where the 4.5V or 12V wires can connect: two on the bottom, two on the top, and one on the side. You've probably seen an example of the wire already in some 12V MOC. Here I've included a picture of the end of the wire. Technically, this is known as a double molex connector. The three holes in the front of the wire end can connect to another wire to add another motor or lamp, or to extend the cable. In addition to motors, 4.5-volt lamps were also produced. These lights are the shape of a yellow 2x2 brick. They work wonderfully for fireboxes, due to the rectangular shape and the yellowness of the bulb. As lights however, they're only useful for certain prototypes, as most locomotives have round lights.



From a picture of the battery wagon, you can see the red three-way forward/stop/reverse switch that controls the polarity of the circuit. Kindly enough, LEGO provided two ways to control the wagon without chasing down the train and grabbing the car (though that is fun). First, we have the Train Direction Switch, as BrickLink® calls it. When the train passes the piece, the bar standing up track-side hits the switch on the wagon and reverses the train. If you don't have the piece, a corner of a box also works well. It is important to note that this piece cannot be used with a bogie that is 8 studs wide, or with the valve gear of a steam engine.



The Train Signal Post stops the train in a more unusual manner. Turning the little lever at the back of the post lifts up the circuit breaker bar, which is positioned between the two rails. This bar hits the red button at the bottom of the battery car when it passes. The picture only shows the bottom half of the signal post. The top half contains a signal that moves up and down depending whether the bar is raised or lowered.



Playing with Radii - 4.5 Volt Edition

Regular 4.5V track is made from three pieces: outer curve, inner curve, and straight rail. These snap on to the 2x8 railroad ties, which are placed once every 8 studs. This spacing is twice as much as the prefab track; however, extra 2x8 plates can be placed underneath the track if desired. It is also easy to pretty up the track with 1x1 and 1x4 tiles to suggest smaller ties. A major plus for 4.5V track is that it's dirt-cheap, and straight track is plentiful.

To make a curved section of track, the outer radius must be bigger than the inner radius. In standard radius 4.5V track, this difference is large. It would be extremely useful to change this difference, as doing so would change the radius of the curve. This is surprisingly easy to do and requires no custom parts. There are two very similar ways to modify the standard curve. The standard sharp radius curve uses an outer radius segment and an inner radius segment (right curve in diagram). Wide radius curves are made by replacing the inner curve segment with a straight rail segment (left curve in diagram). Medium radius curves use the straight rail segment in place of the outer curve segment (middle curve in diagram). The wide radius curve is 110 studs in radius while the medium radius curve is about halfway between the standard radius and the wide radius. Both methods connect with a bit of fudging, but I wouldn't recommend the medium radius curve. The stress is very great and if you have old, brittle sleepers, the clips on them may break off. The wide radius curve seems to be okay for extended use. My train cars run very smoothly on these curves and the track should withstand heavier 8-wide stock.

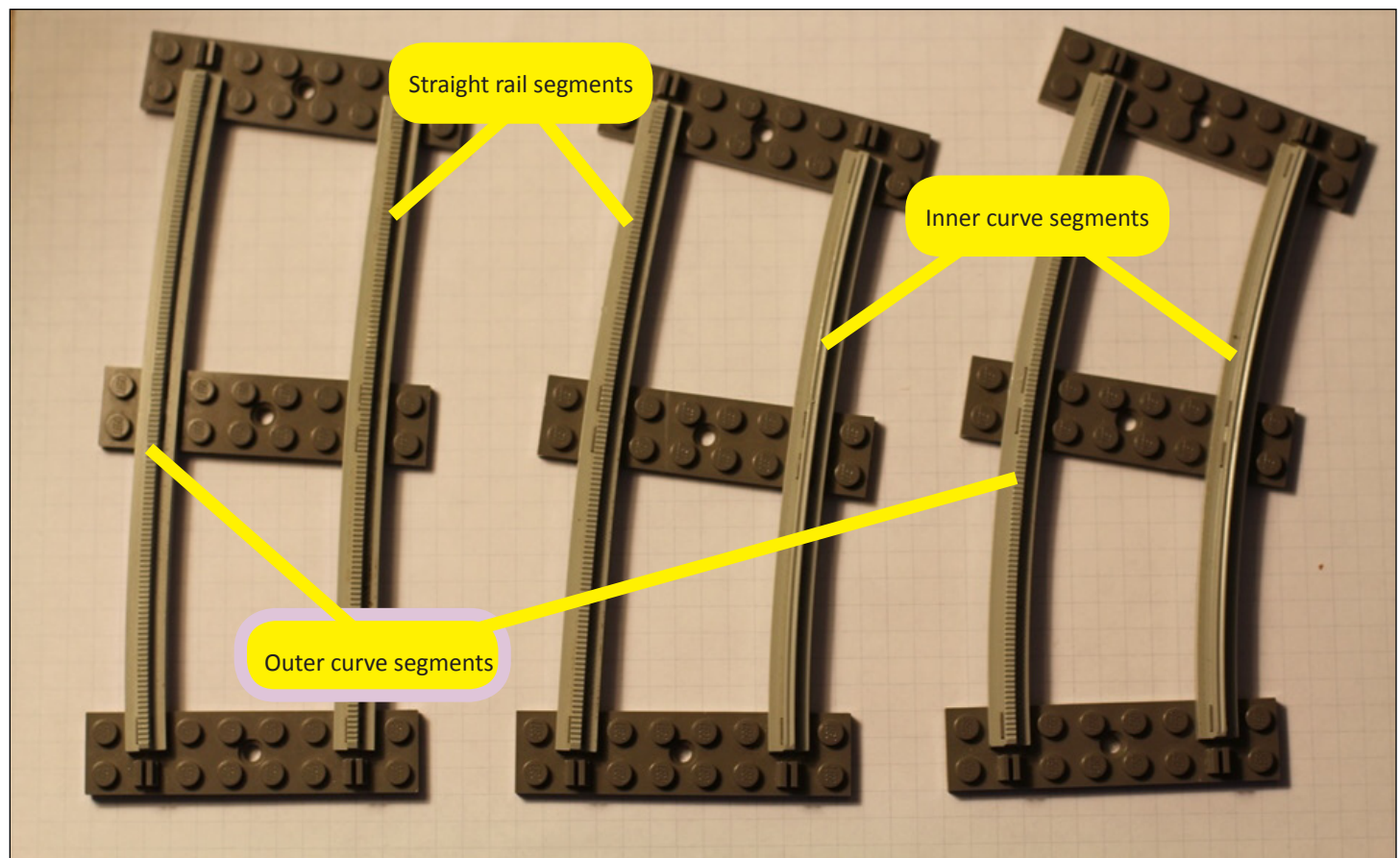
The "D" Layout

After developing stressed 4.5V curves, I immediately pondered about how to use them in a layout that would fit in a space that barely accommodated a full circle of these wide radius curves. The solution was a D shape, which let me use two quarter-turns of wide radius track and two quarter-turns of standard curved track. To maintain smooth operation around the "D" the two standard curves in the foreground are banked. A switch squeezed between the two sections of wide radius curves gave space to include a return loop, something I've wanted to have in a layout for a while. Another switch in the return loop gives space for a small siding with a spring-loaded buffer. The empty space in the "D" functions as a building area (Yes, I'm still a floor builder). In this picture, you can also compare the wide radius curve to the standard radius.

In Conclusion

There are apparent disadvantages with the 4.5V system. The electronics are poor for 8-wide builders and are hard to integrate in a high-level LUG layout. Also, building articulated bogies is quite the challenge with a 4.5-volt motor.

The advantages of 4.5V trains are more pronounced. In terms of track, 4.5V track offers a lot more flexibility than 9V and PF track, due to separable rails. As we have shown, custom track can be easily made with the system. In addition, the motor is quite useful for steam engines. In my opinion, 4.5V is best for 6-wide steam builders such as myself. 

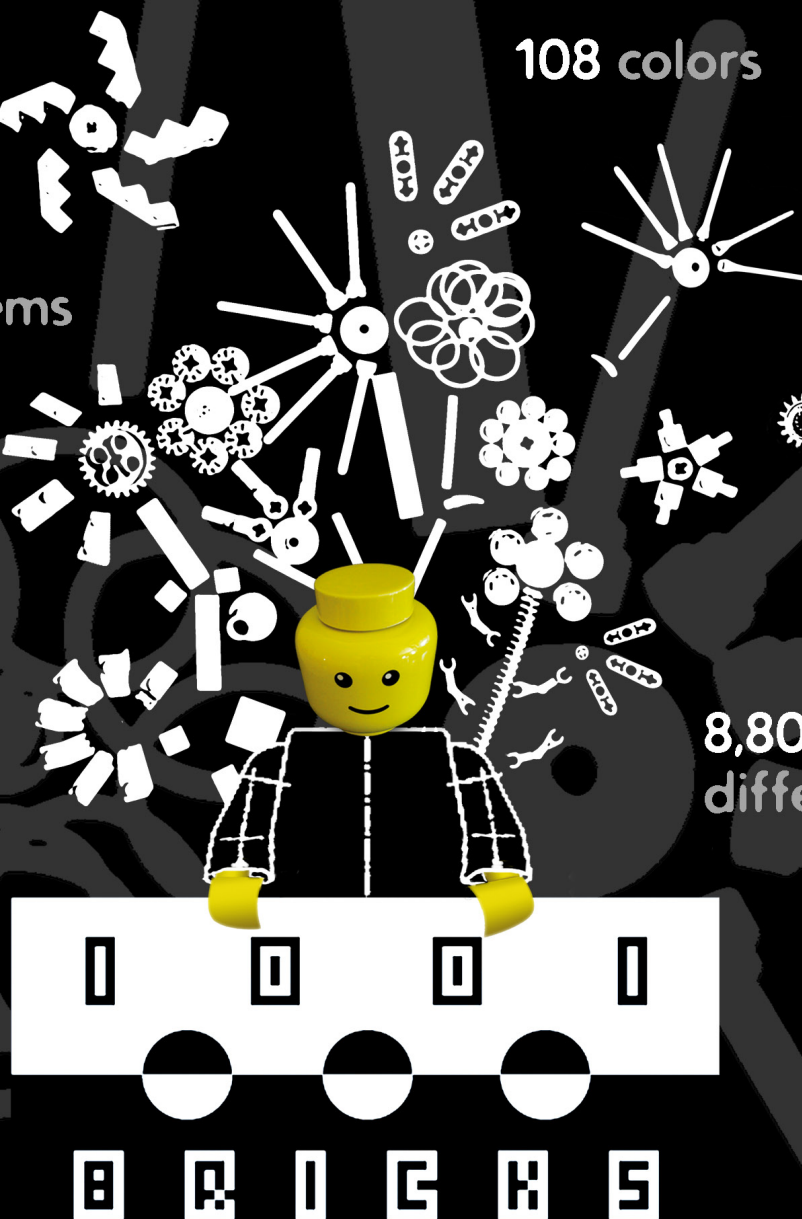


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LEGO PF Trains to The Limit - LEGO Shunter

Article, photos and
programming by
J.A. Korten



A

In this series we will discuss ways to take LEGO® Power Functions to the next level by adding some cheap, but non-LEGO parts.

In Issue #13, we discussed the basics and created a remote-operated computer controlled train. This time we will automate a shunter. This solution is ideal for exhibitions and events. Children will really love it. Parents and AFOLs alike will be interested in the technology.

Introduction

Arguably one of the best classic trains from the 12V era is shunter 7760, the little blue locomotive with gray roof and yellow / black chevron pattern at the front and back. I upgraded mine to a PF version. Now I want to shunt some cars.

Introduction to Arduino Microcontrollers

What we need:

- An Arduino UNO (or compatible)
- A 940nm Infrared LED
- Two reed sensors (*) preferably a plastic version like the HAMLIN - 59165-1-S-00-A - REED SENSOR, MOULDED SWITCH (available from Mouser® or Farnell)
- Two $\pm 10k\Omega$ resistors (*)
- Wires (*)
- Powerful neodymium magnets (optional) (*)
- For testing, two small breadboards (*)
- A LEGO Power Functions receiver and a LEGO train
- Arduino software
- Arduino Library (thanks to Roland Wiersma)
- Hot glue and a soldering iron + solder (optional) (*)
- A multi-meter with continuity test function (optional)

Note: Marked items are new compared to the previous article. Costs of the new items are about \$5.00 when including the breadboards.

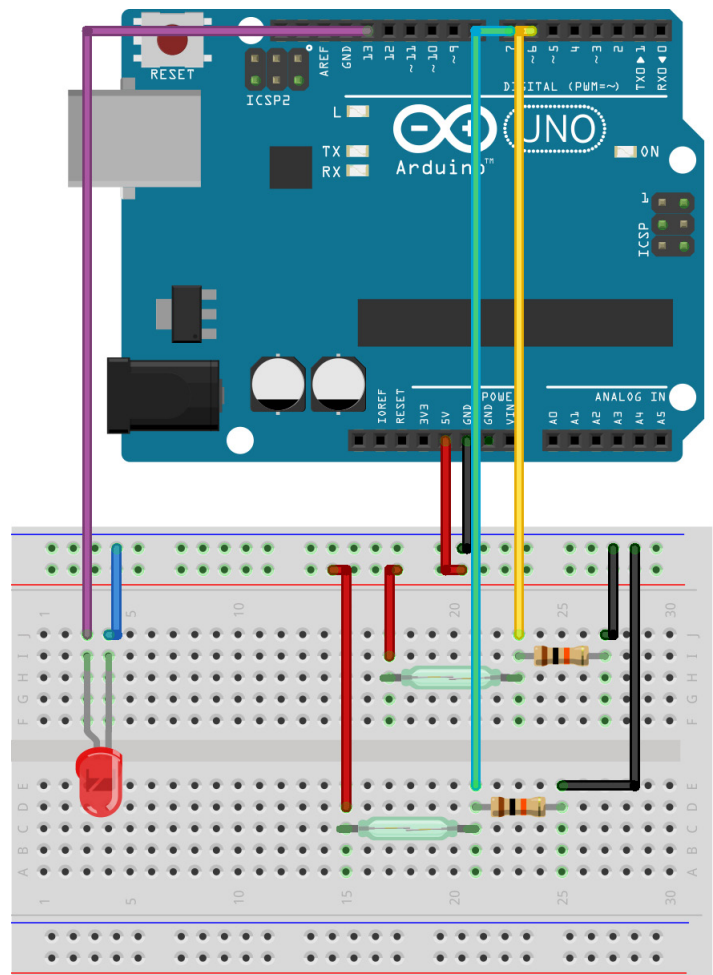
We again used LEGO Digital Designer, Fritzing and Arduino to create the new train system.

Basics of Inputs

Last time we only used the IR led as an output. Now we are going to use two sensors in order to detect the train. Sensors are always considered inputs. After testing we have seen that a reed sensor is able to sense a train motor since there are magnets inside. Reed sensors are switches that react to the presence of magnets. Without the magnetic field, the switch stays open, when a strong enough magnetic field is applied, the reed switch closes.

There are some tricky things with reed sensors that we will explain later.

First, some basic electronics: If the reed switch is closed we want to read this in Arduino as HIGH, if the switch is not detecting a magnet we want to read a LOW.



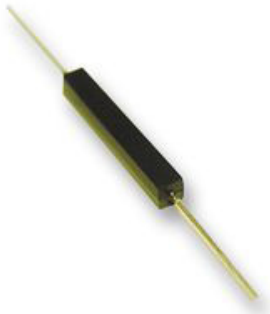
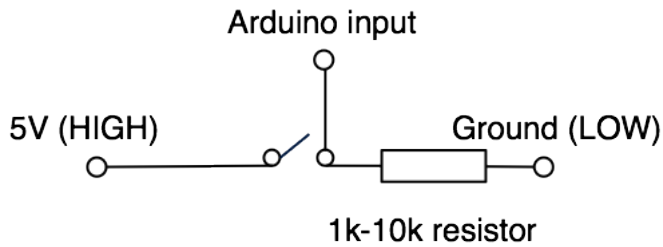
Made with Fritzing.org

The Arduino UNO Rev 3 with an IR led and two reed sensors connected to it.

The simple schematic to the left shows the same circuit as the one with the Arduino. If one presses the switch, the input reads HIGH (5V), when the switch is open, one reads LOW (GND, 0V). The resistor makes sure there will be no short.

For beginners this is a bit tricky but it is worth the trouble, as you will see.

There are several types of reed sensors; we prefer the ones with a plastic housing. The glass ones tend to break, etc. The HAMLIN one from the parts list fits exactly between two studs. You may want to do some experimenting with a multi-meter (beep on continuous/short function). The (PF) train motors have magnets inside that seem to work well; you could also add special magnets. In our setup we placed the sensors on top and parallel with the tracks and that works very well. Make sure that your reed sensors are as close to the outside as possible for better motor detection. Also keep in mind that if the sensor is too high under the train, it will also detect the coupling magnets.



A trick to make detection as faultless as possible: Couple the reed sensors in parallel to each other, one close to the left rail, and one close to the right rail.

This source code (RailBricks_v1_part2a.ino) expects an oval with one reed sensor connected to pin 7. The train will stop when the sensor is detected (after 200 ms, otherwise it might stay directly on top of the sensor), then drive again after four seconds have passed.

For a shunting train we want something different. We add another sensor and a point with some straight track in the oval. The point should stand in open position in such a way that when the train backs up it will turn to the straight track with a dead end. Sensor 1 is the sensor after the point in the oval. Sensor 2 is the sensor at the dead end. The next issue will deal with point control, so we won't discuss that now.

Two Sensors: Backing Up and Moving Forward

To make the program more understandable we present an activity diagram.

We start by driving forward. When the train sees sensor 1 it will back up after 4 seconds, then it will stop at sensor 2. After 10 seconds it will go forward again. It will then ignore the first sensor 1 trigger. It will start all over again till the battery is flat.

My newest version of the 7710, Power Functions enabled and ready to be controlled.



In source code 2 (RailBricks_v1_part2b.ino) we see how this is worked out.

The layout shows how we set up two sensors. The train will be facing to the right at the bottom parts. The point will always be set to turn.

```
/*
  WE WILL SEND SOME BASIC POWER FUNCTIONS
  SIGNALS TO A LEGO TRAIN.
  THIS ONE WILL GIVE YOU THE BASICS FOR A
  SHUNTER.

  J.A. KORTEN FOR RAILBRICKS
  LIBRARY BY ROLAND WIERSMA
  NOVEMBER 2012

  V1.2 - SHUNTER PART ONE
*/

#include <LEGOPowerFunctions.h> // THIS
IMPORTS THE LEGO PF LIBRARY

// THE IR LED IS CONNECTED TO PIN 13
// LONG LEAD IS CONNECTED TO PIN 13, SHORT
LEAD TO GND

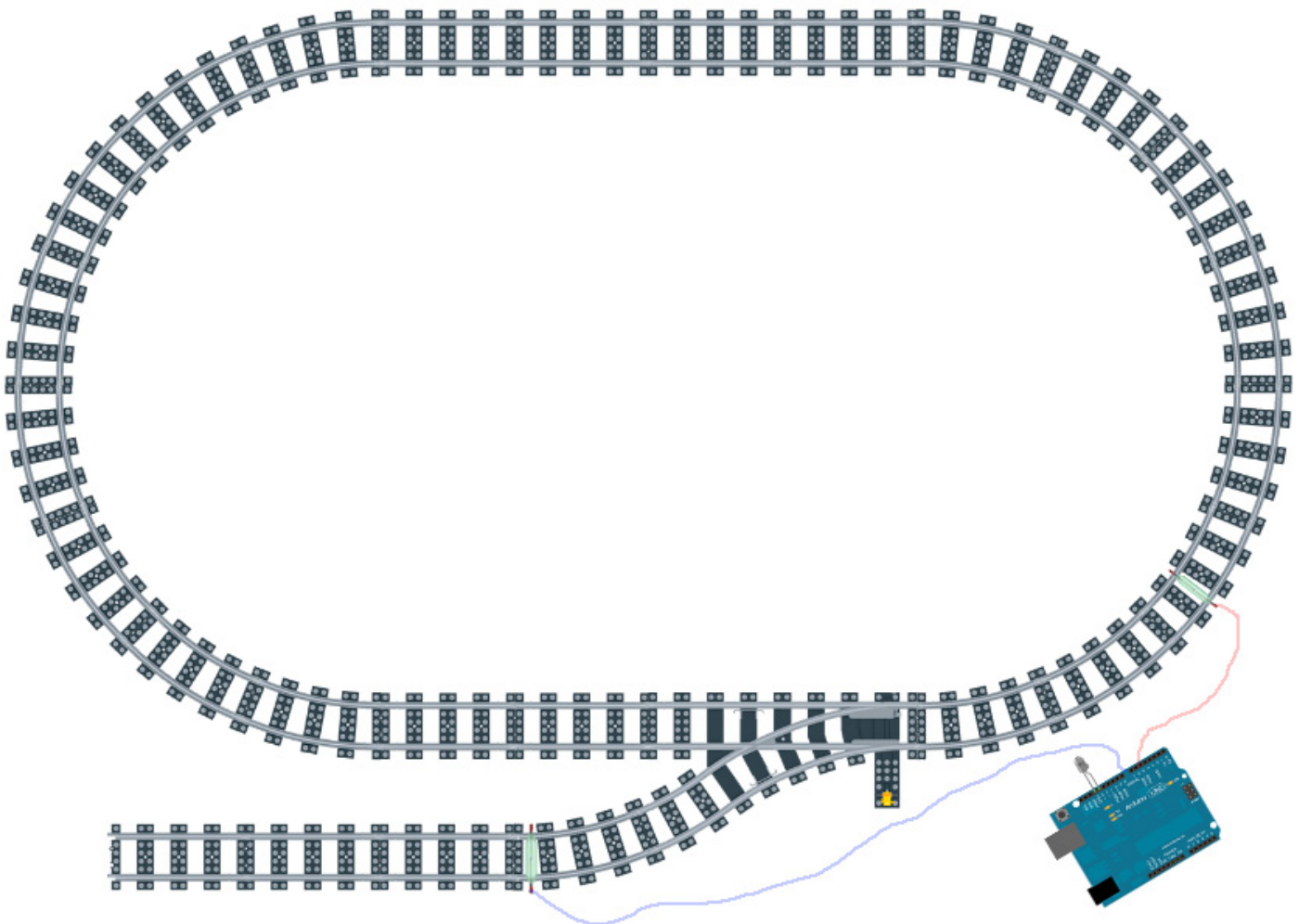
LEGOPowerFunctions LEGO(13); // SETS ALL PF
STUFF AND MAKES PIN 13 OUTPUT
int sensor1 = 7; // THE REED SENSOR 1
CONNECTED TO ARDUINO PIN 7
int myspeed = 10; // MY DESIRED FORWARD
SPEED
int myoutput = BLUE; // PF COLOR OUTPUT I
WANT
int mychannel = CH4; // PF CHANNEL I WANT TO
USE

void setup() {
  pinMode(sensor1, INPUT);
  LEGO.singleOutput(0, myspeed, myoutput,
mychannel); // LET THE TRAIN RUN.
}
```

YOU NEED:

- A. A REED SENSOR
- B. AN IR LED
- C. A LEGO PF TRAIN :)

*/



```

VOID LOOP() {
  IF (DIGITALREAD(SENSOR1) == HIGH) { // WE
    DETECT THE SENSOR
    DELAY(200); // WAIT JUST A LITTLE
    OTHERWISE TRAIN WILL STAND ON SENSOR.
    LEGO.SINGLEOUTPUT(0, 0, MYOUTPUT,
    MYCHANNEL); // STOP!
    DELAY(4000); // WAIT FOUR SECONDS
    LEGO.SINGLEOUTPUT(0, MYSPEED, MYOUTPUT,
    MYCHANNEL); // GO!
  }
}

```

Ideas for Optimization

It would be - arguably - even nicer to include a function to count the number of rounds, then, only after a number of rounds, start the backup procedure.

In an upcoming article, we will learn a way to control the points and then we have even more options.

This example software for this can be found at www.leguano.nl under "RailBricks_v1_part2c.ino".

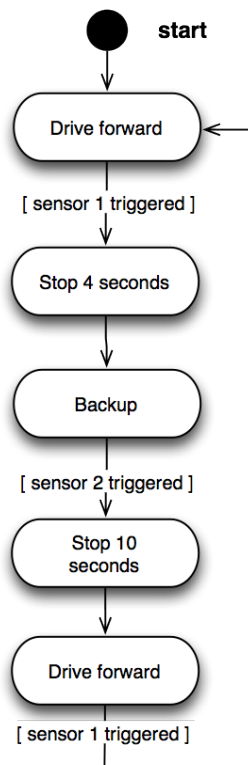
Computer Controlled Shunter

We will add one more extension to the train: a way to start and stop the shunting operations. This is not very complicated at all. Although we will use the terminal from Arduino, this could well be the base for tablet controlled LEGO PF trains (We have experience with that and it is doable for sure).

The trick is using the serial port of the Arduino. Although Arduino has a USB port, this emulated the old RS232 port, modem port or, in some cases, keyboard or mouse input (depending on the Arduino model).

The call `Serial.begin(9600);` will start serial communications. When you open the Arduino terminal, the Arduino resets itself and will then start sending characters, if needed, to and from your terminal (the looking glass at the right top of the Arduino software).

If you press the letter g + enter, the train will start moving and start its shunter operations (running 5 loops forward, then backward towards the dead end, then wait and repeat). When you press letter w + enter, the



```

/*
  WE WILL SEND SOME BASIC POWER FUNCTIONS
  SIGNALS TO A LEGO TRAIN.
  THIS ONE WILL GIVE YOU THE BASICS FOR A
  SHUNTER.

  J.A. KORTEN FOR RAILBRICKS
  LIBRARY BY ROLAND WIERSMA
  NOVEMBER 2012

  V1.2 - SHUNTER PART TWO (RAILBRICKS_v1_
  PART2B)

  */

#include <LEGOPOWERFUNCTIONS.H> // THIS
IMPORTS THE LEGO PF LIBRARY

LEGOPOWERFUNCTIONS LEGO(13); // SETS ALL PF
STUFF AND MAKES PIN 13 OUTPUT
INT SENSOR1 = 7; // REED SENSOR 1 CONNECTED
TO ARDUINO PIN 7
INT SENSOR2 = 6; // REED SENSOR 2 CONNECTED
TO ARDUINO PIN 6
INT MYSPEED = 10; // SPEED FOR DRIVING
FORWARDS
INT MYBSPEED = 5; // SPEED FOR DRIVING
BACKWARDS
INT MYOUTPUT = BLUE; // PF COLOR OUTPUT I
WANT
INT MYCHANNEL = CH4; // PF CHANNEL I WANT TO
USE

VOID SETUP() {
  PINMODE(SENSOR1, INPUT);
  PINMODE(SENSOR2, INPUT);
  LEGO.SINGLEOUTPUT(0, MYSPEED, MYOUTPUT,
  MYCHANNEL); // DRIVE FORWARD
}

VOID LOOP() {
  IF (DIGITALREAD(SENSOR1) == HIGH) {
    // [ SENSOR 1 TRIGGERED ]
    //DELAY(100);
    LEGO.SINGLEOUTPUT(0, 0, MYOUTPUT,
    MYCHANNEL);
    DELAY(4000);
    // STOP 4 SECONDS
    LEGO.SINGLEOUTPUT(0, MYBSPEED, MYOUTPUT,
    MYCHANNEL); // BACKUP TRAIN
    DELAY(500);
    // MAKE SURE WE IGNORE SENSOR 1!
  }
  IF (DIGITALREAD(SENSOR2) == HIGH) {
    // [ SENSOR 2 TRIGGERED ]
    LEGO.SINGLEOUTPUT(0, 0, MYOUTPUT,
    MYCHANNEL);
  }
}

```



```

    DELAY(10000);
// STOP 10 SECONDS
    LEGO.SINGLEOUTPUT(0, MYSPEED, MYOUTPUT,
MYCHANNEL);
    DELAY(500);
// MAKE SURE WE IGNORE SENSOR 2!
    WHILE (DIGITALREAD(SENSOR1) != HIGH)
{
    // MAKE SURE WE IGNORE SENSOR 1 ONLY
    THIS TIME...
    // IGNORE SENSOR 1... SO WE MAKE A
    LOOP FIRST.
}
    DELAY(1000);
// WAIT TILL SENSOR1 IS REALLY PASSED
}
// GO TO START AGAIN ...
}

```

Note: This example with terminal control is called: "RailBricks_v1_part2d.ino".

Johan Korten
johan.a.korten@gmail.com

Relevant links:

- www.arduino.cc (Arduino software and examples, also YouTube demo movie)
- www.fritzing.org (to digitally draw electronic circuits)
- www.leguano.nl (all examples plus the remote library)

Upcoming articles in this series:

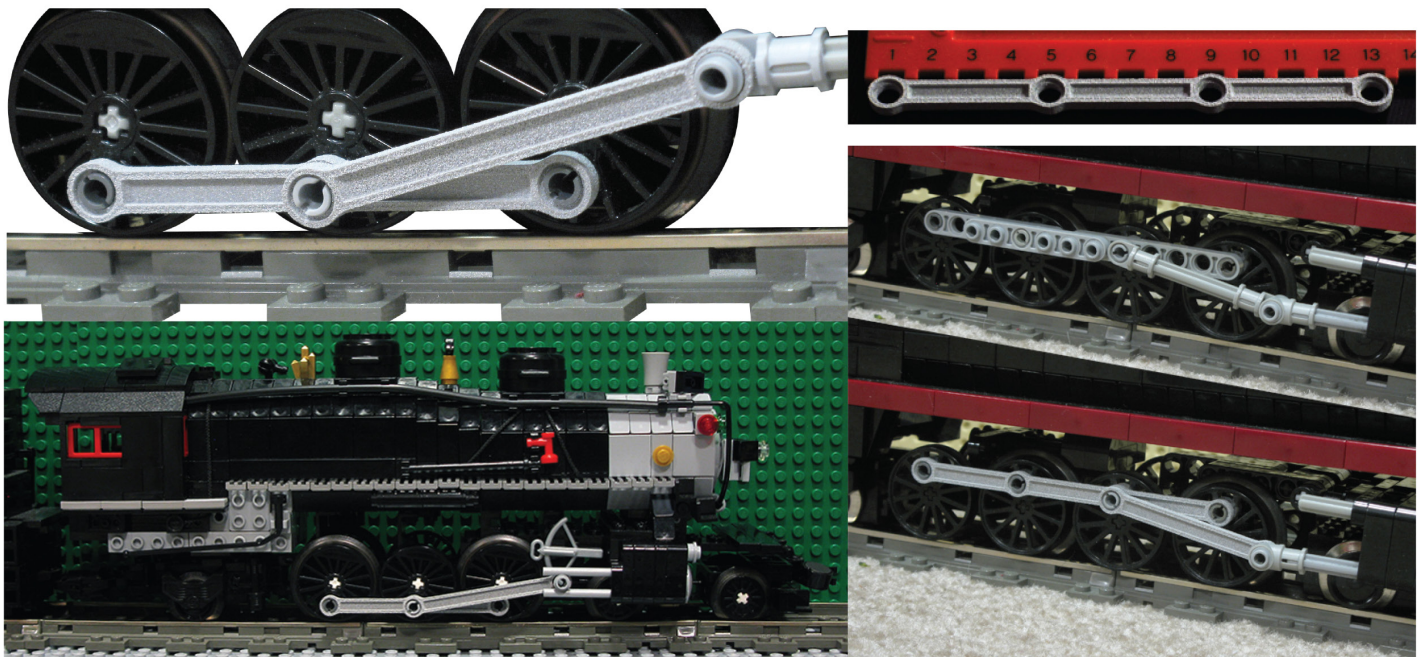
- Your own LEGO PF compatible receiver and some turnouts.
- Connecting it all together and going beyond the standard LEGO capabilities. 

train will finish its current round and stop at the dead end. Of course these are just examples. Be sure to fiddle (or in Arduino language, tinker) with it to make your perfect system. As always (hoping to be a good computer science teacher), I welcome your commands and questions.

CUSTOM STEAM DRIVER RODS

Shop: <http://TrainedBricks.com>

Examples: <http://Examples.TrainedBricks.com>





Accidentally on Purpose

By Tony Sava

I decided long ago that I wanted to attend Brickworld™ Chicago 2014. I hadn't been since 2009 and it was high time I went back. Steve Jackson and I had traveled to Atlanta together for the NMRA National Train Show the year before, and he and I were both keen on visiting Chicago.

Texas Brick Railroad is a young club; we have some really talented folks, but our infrastructure is lacking. For NRMA we borrowed my father's trailer and a bevy of tables from TexLUG, but the tables are heavy and the trailer is open, and it just caused headaches for a two-day trip (not to mention setup and teardown). For Brickworld, in addition to Steve and me, Ed Chang was planning to attend, so we would not be lacking for MOCs.

I had heard through Facebook that Cale Leiphart and Nate Brill would be the only folks from PennLUG able to attend Brickworld this year, but they were planning on loading up the PennLUG trailer and bringing a full layout. TBRR needed tables to display upon, and PennLUG needed help setting up; the fact that TBRR uses the same ballast standard as PennLUG seemed to just be icing on the cake. So emails were exchanged, offers were made, and in no time a plan was coming together that even John "Hannibal" Smith would love.

PennLUG's plan was ambitious. A very large circular layout with nothing but Grand Curves (what PennLUG and the rest of the world calls "wide curves"), the signature huge PennLUG switching yard, and a huge branch line for Cale's new Red Lion station. For our part, TBRR would pull out my old Palestine station and our signature huge collection of trees.

And that's the way things remained until about a month before Brickworld, when Ed decided our area needed something more. A few huge purchases and three weeks later, Ed had nearly finished construction on a huge raised hill and three-bridge addition to our layout. Even with a group meeting Sunday before Brickworld we couldn't finish it in time, so Thursday at the show Ed spent several hours finishing his creation.

With the help of Scott Miller and Rob Werner from GFLUG, the joint PennLUG and TBRR layout was set up and running smoothly. It truly was something to behold. I had never been able to run any of my trains

on a full Grand Curve layout like that, and neither had Ed nor the guys from GFLUG. Scotty spent nearly every moment at Brickworld performing real yard operations in PennLUG's yard and the Red Lion spur, building trains and challenging himself to never use "the hand of God" to touch the trains (except in derailments and decoupling). I had fun running my Daylight and T1 at full bore around the large loops, though my Daylight disliked PennLUG's Grand S-Curve.

As the convention progressed, something a little unexpected happened. We began collecting train-heads. People started visiting our layout, running their trains on our layout, or just sitting in the center and chatting. Our purposeful venture to unite two groups of train builders was accidentally uniting train builders from all over. We even had one of the TFOLs on public day come and ask to run his train, which was carefully packed up in a long cardboard box. Matthew Csenge parked his train MOCs in our yard, where previously they had been parked in his registered space elsewhere in the convention hall.

We've already begun planning for next year. I've heard the GFLUG guys talking about making their own addition to the layout, and there could be others. TBRR would like to get more of our members involved, certainly. Brickworld 2015's theme is Brick to the Future, and from where I sit the future looks very promising. 



Behind The Scenes:

An Interview with LEGO Train Designers Ricco Rejnholdt Krog and Henrik Andersen.

Earlier this spring, RAILBRICKS volunteer Cale Leiphart talked to Ricco Rejnholdt Krog and Henrik Andersen, two of the designers behind the 2014 LEGO City trains sets. Our thanks go out to The LEGO Group for helping arrange this interview, which gives us a look into the design process.

RB: Have you worked on previous train projects?

R/A: I have designed and developed all of the elements for trains for LEGO World City; the Santa Fe Express; and LEGO City Trains in 2006, 2010 and 2014.

RB: Are you a train fan yourself? And if so do you build any trains in your free time?

R/A: I am a train fan. I don't build trains in my spare time, but do collect LEGO trains and I have a big collection of 4.5V, 12V and 9V trains.

RB: These new sets will now be the second generation of trains in the City line using the Power Functions system. Have the Power Functions trains been considered a success?

R/A: In general most LEGO trains have been successes, and our LEGO City trains with Power Functions have been part of that success.

RB: What are some of the challenges faced in designing trains sets around the Power Function components?

R/A: There are a few design challenges presented by the Power Function when designing train sets that use



Henrik Andersen

them. Concealing the Power Function element is the biggest challenge; the battery box and receiver take up a lot of space, so it is difficult to create small trains, like a shunter train. Another challenge is communicating to our target age group – 6 year old children - how to build and play with the Power Function components.

RB: The new passenger train uses a single molded nose piece in place of the brick-built nose of the previous 7938 Passenger Train. What influenced the decision to use the one-piece nose on the new train?

R/A: The decision to use a single-molded front nose piece was influenced by two factors. First is the complexity of the model when building; it is easier for our target age group to build with the single-molded piece. Second is the flexibility in design that a single element gives us the opportunity to do that a brick build front doesn't.

RB: After the ill-fated molded nose of the 7897 RC passenger train, many fans were pleased to see a return to the multipart brick-built nose for the 7938 train for its more traditional LEGO look and the versatility of its individual parts. Now with the return of a large nose piece

for the new train, fans are understandably leery about adopting what many consider to be a single-use piece. Do you feel that when fans finally have their hands on the new train they will be more accepting of the new nose piece and use it in their own trains?

R/A: The reactions from fans in response to the 7897 RC passenger train molded nose piece were understandable. The piece had a very big gap between the element and the rest of the model. I think fans will be happy with the redesigned element, as the gap has been removed and a new glass part has been added so the whole front looks really good. For any piece to be used in a different context, it's up to the creativity of the builder.

RB: The new freight train appears to have a bit of an American diesel locomotive influence. Was this intentional and is it an attempt to appeal to the American market more?

R/A: The new design is based on a more American freight train look. Using the American freight train was a way to differentiate the new design from our sets based on more European freight trains.

RB: When designing new train sets does the design team typically look to real trains for inspiration?

R/A: As with other LEGO City models, our team researched real-world trains and was inspired by interesting designs to incorporate into our models.

RB: What are some of the design consideration when creating a new train set? Are their specific goals for what should be included?

R/A: When creating a new train set, the model itself is king. Our main objective is to make a cool model; after that we consider the play value in the model. For passenger trains, we add play value by creating ways to load and unload passengers, and introducing extras such as road crossings. For freight trains we can differentiate, and get more play value in the set by creating new ways to drive the train, load and unload cargo, play with the crane, load onto the truck and drive away – and like with the new train, even feed and milk the cow.

RB: The new freight train set has many accessories included to expand on the set's playability while the

new passenger train relies primarily on the train itself. Is this simply to keep the price point of the passenger train lower or were there other factors under consideration as well?

R/A: The passenger train focuses primarily on the play value of the train itself as it is an entry point for most children; therefore, we like to be able to keep it at an entry level price point as well.

RB: All three of the previous City train sets included flex track. But in the new sets flex track appears to be absent. What was the decision behind this and how successful has the flex track been?

R/A: Generally, the flex tracks were a success, as they allow for more flexibility when designing the layout of the track. We chose to leave them out of the new sets in order to make room for other elements, and add more differentiation between the train sets.

RB: Many fans would like to see LEGO expand its track selection. The now retired 7996 Train Rail Crossing has steadily risen in price in the aftermarket and there is a desire to see LEGO rerelease it as well as introduce new parts such as larger radius curves and crossings. What are the issues LEGO faces in expanding the track offerings and will we ever see new pieces be developed?

R/A: We do not offer a more varied selection of track elements because through our research, we have determined that there is not a high demand within our core audience of children for these elements.

RB: All of the Power Functions, City train sets released so far have been based on diesel or electric locomotives. Do you feel we will ever see a City steam train? What would be some of the challenges in developing a steam train for the city line?

R/A: LEGO City Steam Trains have been tested in concept with children in our target age group many times. While the children generally like the steam trains, they are not perceived to be as cool as the powerful diesel or electric trains. On top of that, LEGO City is a modern city, and steam trains are a bit too old school.

RB: For years fans have been calling for LEGO to produce

individual train cars and locomotive sets as well as train side structures and accessories. Does LEGO feel there is a viable market for these and might we ever see LEGO extend beyond complete train sets and the usual passenger station offerings?

R/A: Offering individual train cars and locomotive sets, as well as train side structures and accessories, is something to be considered when the demand in our markets warrants it.

RB: In order for the LEGO train hobby to grow it's important to bring in new fans and keep them interested in the long term. How has LEGO worked to do this and what role do you feel us train fans can play to help with growing our hobby?

R/A: The LEGO Group tries to interact as much as possible with the different train fans and communities around the world, listening to input and visiting events. I have visited a couple of fan based events where the public was invited; I believe the more visible you are, the more new fans will get involved.

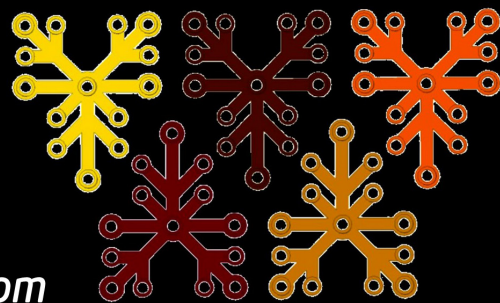
RB: In recent years many fans have started producing and marketing their own 3rd party parts for use with LEGO trains. Big Ben Brick's steam drivers and ME Models metal track being notable examples. Does LEGO see these 3rd party parts as a concern or does LEGO accept them and see them as a good way to fill a hole in the LEGO train hobby that wouldn't be viable for LEGO itself to fill?

R/A: The LEGO Group welcomes fan initiatives that can help grow the fan culture, as long as our trademarks and copyrights are respected.

RB: Finally what would you like to see in the future of LEGO trains?

R/A: In the future, I would like to see more trains in general, and maybe even a separate train theme that could allow for all kinds of trains from all eras in history. I have also always wanted to create a big turntable side building with round house – this building is so iconic for trains. 

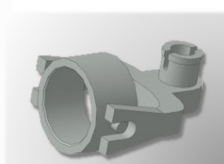
alt Bricks.com



altBricks – your source of new and alternative bricks for your imagination ...



...20 leaf colors, 6 tree kits, 55 street signs, 25 train and architecture elements!





60050

Train Station

Review by Ronald Vallenduuk

In 2010 train station 7937 was introduced along with the initial batch of Power Function trains. Now, four years later, we have a new station. It's a modern looking structure with two shops, one for refreshments and one mini LEGO® brand store and, like last time around, it comes with a yellow cab.

Let's start with the box. The front shows a picture of what you're buying. On the back of the box, as usual with a City set, there's a character shouting "HEY!" at you along with snapshots of play features. Open the box and you'll find bags numbered 1 to 5, a bag with beams and plates, a pack of track and three instruction books.

Book and bag 1 are for the taxi. It's a typical City car using familiar elements like wheel arches and SNOT parts for front and back. It's difficult not to compare it to the taxi in the previous station set; it's the same size and the same color, though it's slightly lower. As a result, the driver

does not get a seat; the poor guy gets the passengers' feet in his back.

Book 2 and bags 2 and 3 build the platform and the first of the shops. The platform is a simple solid structure. A nice touch is the jumper tiles on the steps to place minifigs on. The shop, too, is a simple effective structure. As you'd expect from a City set there are no challenging techniques and it's all easy to build, using some large pieces. The shop still has many nice details though; different types of food (a pizza, a hotdog, a croissant), a cash register and a coffee machine.

Book 3 and bags 4 and 5 build the other shop and the canopy. Interestingly, the front of the LEGO shop uses two of the 2x12x4 windscreens; a part you don't find in sets very often but that is used to great effect here. The canopy is made of big 4x8 curved slopes, again using large pieces to great effect.



machine and security cameras. The curved 2x4 slopes work really well as signs, both for the shops and for the departures. I'll forgive the designers the American spelling of City Center. In the LEGO brand store the sets are blue tiles with stickers, similar to set 3221/7848. The large one I recognized as tow truck 60056. In both shops the checkout is a computer screen with keyboard. No more cash registers.

One detail that doesn't work for me is the clear yellow tiles on the edge of the platform. They have very little contrast with the grey platform. I would recommend using those tiles as headlights for your cars and putting some white or yellow tiles or grilles on the platform. A nice little extra is

Once the station is built, let's have a look at the overall model; first from the perspective of the target audience. It's a nice modern looking station that goes well with the high-speed train. The passenger train set comes with 4 straight track sections. The station adds another 4 so it occupies one side of the track oval. The shops are open at the back so you can play inside. The canopy over the track is not quite a tunnel but children love seeing trains running under something.

To adults, the structural elements (using Technic suspension arms) may look a bit odd. Luckily, and ironically, they have no structural function and can easily be removed. That leaves the canopy that covers the track instead of the platform. It's not easy to turn around, so that'll require some creative solutions. The total platform length is shorter than the previous station but the usable platform is longer because there are no stairs here that block a chunk of the platform. It's still a lot shorter than the passenger train though, so it needs an extension. On the plus side, there's only a platform on one side of the track, which is more realistic than the old station.

Let's look at some of the details - there are many! Time has not stood still in Lego City and that means in 2014 the train station has a ticket

the bike stand with a Friends-blue bicycle. To continue the green credentials, there are bins on the platform (and they're actually green!).

Time for the statistics. Compared to its predecessor this set contains 17% more parts with a total of 423. That's good news. The bad news is the price has gone up 30%



from \$49.99 to \$64.99. Combining those two shows that the price per part has gone up 11%, from just under 14 cents to just over 15 cents. That's way above the holy 10 cent per part but for a set with 5 minifigs, 4 track pieces, a bicycle and a lot of large parts I think it's not as bad as it sounds.

I must admit my first impression when I saw the first pictures of the station was not very positive; "Look at that weird roof!" After building it though, I really like it. It's a more substantial building than the last station, and with a platform on one side it looks more realistic. The color scheme works well, with tan and red the main colors, and I like the light grey platform. The set has a lot of play elements and some interesting parts. The Recommended Retail Price may seem a bit steep at first glance but is actually quite reasonable on closer inspection. So buy two, give the chef a proper kitchen, the passengers a longer platform and be creative with all those canopy and support elements. 





60052

Cargo Train

Review by Jordan Schwarz

It was a special honor for me to be able to review the brand new 60052 Cargo Train set! Years ago, it was with another freight train set that I had my first encounter with LEGO trains. The year was 1992, and the set was the 4563 Load N' Haul Railroad – the first freight set of the 9V Trains era. Since then, new cargo trains have shown up every few years – albeit in a new guise each time. LEGO trains have progressed from 9V to 1st-generation RC to Power Functions. To review a recurring set like the Cargo Train is a unique opportunity. Each new incarnation reveals something about the evolution of the LEGO Trains hobby and a peek at its future.



So what does the 60052 Cargo Train set say about the future of the hobby? In a nutshell, this is a set that is engineered for maximum play value. This set is a continuation of a general trend toward monolithic, all-inclusive sets. Accessories like the gantry crane or switching points might have been separate sets in the past, but now these accessories have been rolled into one flagship train set. This is a smart move by the LEGO Group, because these all-inclusive sets have more general appeal and a wider audience. And kids can have a good time playing with these big sets right out of the box. The

bottom line: the price tag for train sets keeps going up, but the play value is keeping pace.

First Impressions

The new Cargo Train is hefty indeed. Although LEGO boxes may be shrinking, the Cargo Train comes in a big box that is filled nearly to the top, and it feels weighty.

Inside the box, packaging is top-notch. The box contains some eight numbered polybags. Except for a few unique



parts, each sub-model in the set uses parts from a single polybag, meaning that this set is a straightforward build. These polybags rarely have more than 100 elements, making it easy to find parts. And, the set includes an orange brick separator for good measure. Being somewhat sleep-deprived when I built the set, I put the brick separator to good use!

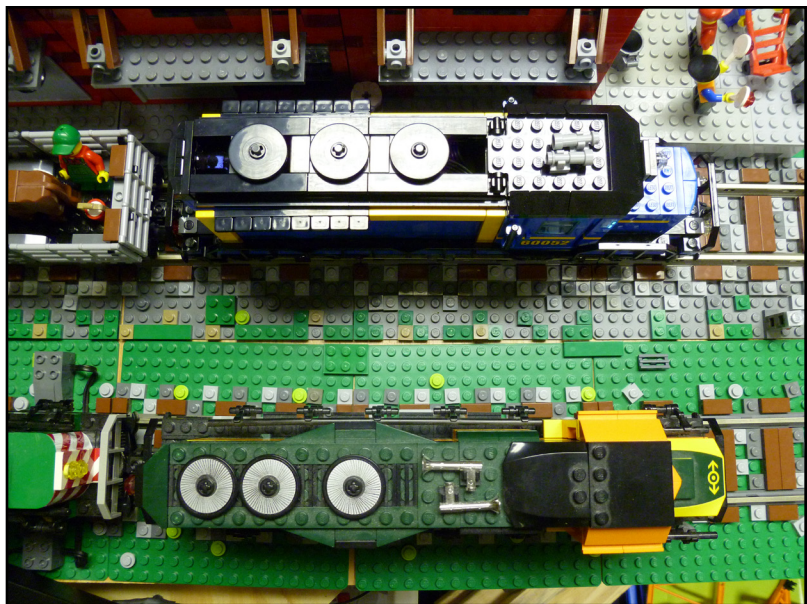
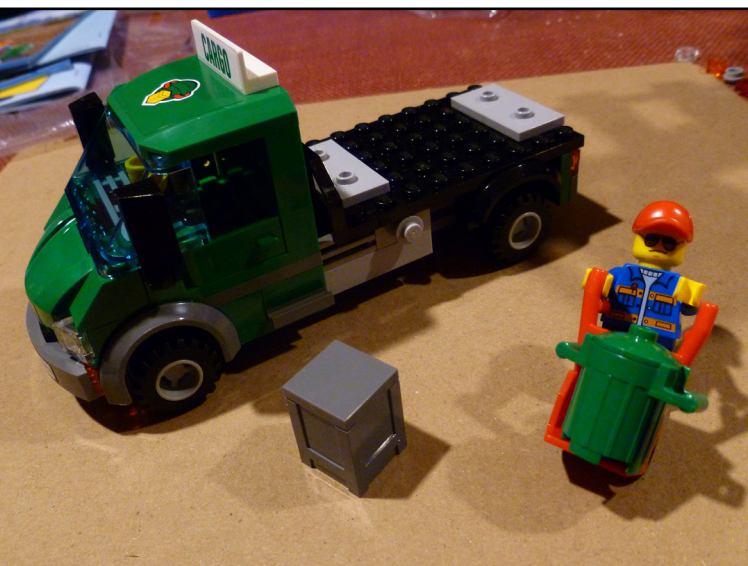
Encouragingly, decals and instructions come in a separate bag with a cardboard backer, and the decals and instructions arrive in great shape. A special cardboard carrier neatly holds the Power Functions elements and some train wheels and couplers. All small elements are bagged, not loose in the box.

The Cargo Train comes with enough track for a complete oval with passing siding. No flex track is present this time.

Model 1: Truck

The build sequence is designed to provide gratification and play value up front. The first model is a cargo truck capable of holding a pallet. The truck design and elements are quite basic, except that there are two of the newer, shallow type wheel-wells. The truck driver has a new torso print – a railroad safety vest over a new-green sweatshirt.

Interestingly, the LEGO Group managed to bypass the container size debate entirely with this set, because there are no containers! Cargo is carried on 4-by-8 stud pallets, but the pallet standard has been changed (again!). Pallets now attach to freight cars by means of jumper plates.



This connection uses fewer parts than the old standard, and it keeps the pallets on the freight car in the event of a roll-over. The pallets are easily converted to the old standard, though.

Model 2: Locomotive

The new locomotive stands out in this set, as it is unusual to see LEGO train sets styled after American prototypes. The new locomotive resembles the EMD family of diesel engines, seen before as the 10133 BNSF GP38 Locomotive and the Maersk SD40-2. This time, the blue-and-gold color scheme brings to mind the American freight line operator CSX.

To fit the Power Functions battery box and receiver inside the engine, similar techniques are used to those seen in the Maersk locomotive. The sides of the long hood are simple panels, held on using SNOT bricks. The battery box is fairly easy to remove (without too much disassembly). Power switch access is ingenious and makes the power “ON” LED visible from the outside.

The engine frame is the same length as the BNSF GP38, but the engine looks shorter due to stockier proportions. The cab is longer (7 studs, vs. 4 on BNSF) in order to accommodate a set of classic train doors, and there is a hatch in the roof allowing access as well. The cab windscreen is a new, more versatile version of the classic 4-pane windscreen seen first in the 4563 Load N’ Haul Railroad.



Although this new locomotive is a little light on technical realism, this is clearly an engine designed for kids to play with. This engine is durable and could probably fall from a table without really sustaining much damage. (I did not test this theory.) The side doors and roof hatch access enhance play value by providing easy access to the cab interior. Some realistic touches include ditch lights, a fuel tank on the underside, and faux dynamic brake radiators.

Model 3: Cattle Car

For some reason, this is my favorite piece of rolling stock in this set. It has a simple, elegant design and is something not often seen in a LEGO train set. Plus, the included steer is a Longhorn! With the cattle car, there is certainly good play value, as potential storylines beckon. Alas, the car comes with only a single steer, but that is

a recurring aspect of this set – the elements are pared down to those essential to play value.

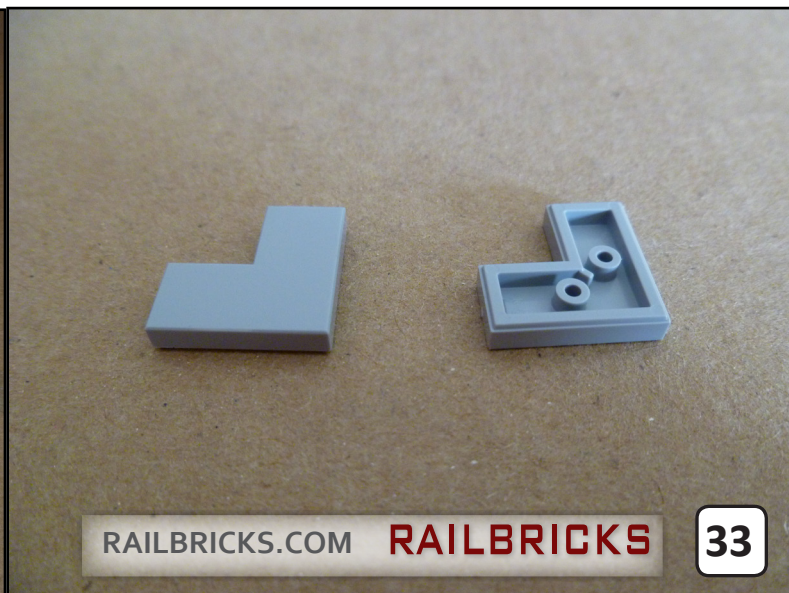
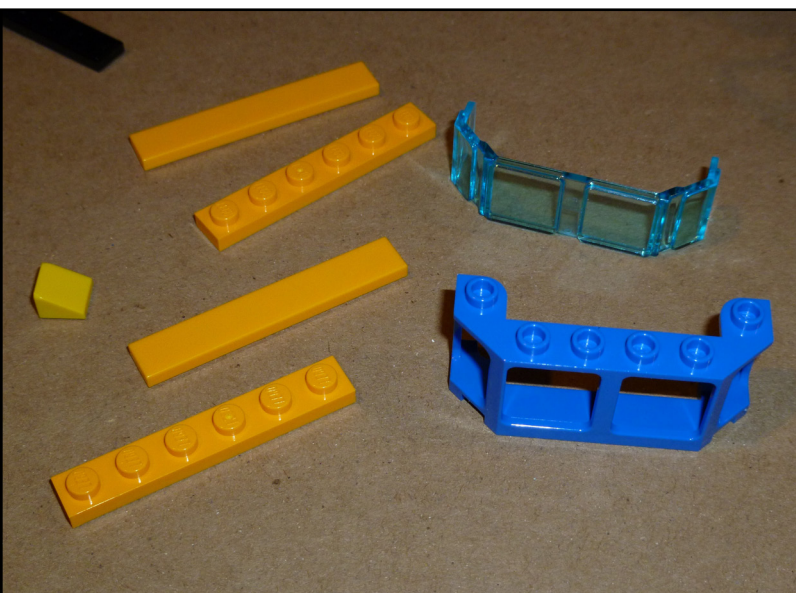
Model 4-5: Flatcars

The flatcars in this set are simple and can be built in just a few minutes. The flatcars reinforce the idea of paring things down to the bare essentials, as there is little more to these cars than standard train bases and trucks. Even these simplistic flatcars are good from a parts standpoint, however. Train bases and wheel sets are hard to come by, so it is nice to see a couple of 4-axle cars included in this set.

Flatcars are good from a play value standpoint, too. Multiple loads can be carried by either car, including pallets and even the forklift that comes with the set. The set includes four palletized loads: an Octan gas tank, a lime green wheelbarrow, and two large spools. These loads can be picked up by the included forklift or, with some amount of rigging, the gantry crane. With two flatcars and a truck available, loads can be unloaded from one mode of transport and loaded onto another. This is a great strategy from a standpoint of play value – and not unlike that employed in the original Load N' Haul Railroad.

Model 6: Forklift

The forklift is conventional in function but novel in design. It is made up of several compound curved pieces, giving it an unusually “swoopy” look for a fork truck. Also, in the ever-more-diverse LEGO City, the forklift driver is a female minifig.



Model 7: Crane / Loading Station

Perhaps one break with previous cargo sets is the inclusion of a bona-fide freight loading station. The included gantry crane and office are reminiscent of the 4555 Freight Loading Station, offered in the mid-90s as a stand-alone accessory. Though less elaborate than 4555, the concept and elements are the same – there is a freight loading terminal with an office and a 2-axis gantry crane. The crane is just tall enough to be able to unload the big spools, delivering these to the truck or forklift.

Interestingly, the crane is not built on a baseplate but rather uses a pair of 16X16 plates as bases. The rationale for this design is not clear to me, as a baseplate would seemingly have been sturdier and with fewer parts used.

The freight station is a home run from a play value standpoint. In all, there are four possible modes of freight transport in this set, making for lots of possible play scenarios. In my speculation, inclusion of the freight station will encourage sales of the set. Even those who do not need another train set may still be enticed by this interesting trackside accessory.

Final Thoughts

There is no doubt about the solid play value of the new Cargo Train. The models in this set are carefully selected to complement each other when played with together. Most of the models in this set are conventional in terms of design, colors, and elements – meaning that the set will not be a showcase of novel building techniques or a gold-mine for rare parts. This set is clearly intended as the ultimate kids' play train, leaving the Creator Expert line to fulfill the niche for the more exotic.

High points: the American-style blue freight engine, the freight loading station, the cattle car, and enough track to build a passing siding.

Low points: lots of AAA batteries needed to run the train, very simple freight cars, and a high price point (although decent value).

With so many possible ways to move freight around in this set, hours and hours of play are in store. There is little risk that this set will appear under the Christmas tree only to be abandoned shortly thereafter. On the whole, the Cargo Train is another great addition to the proud lineage of LEGO trains. 





For this review, I enlisted the help of my six year-old daughter, Gabriella. I thought it would be interesting to see the set through her eyes, as she falls on the low end of the recommended age range for the City train sets. I tried to be as hands-off as possible, letting her take the lead on the build while I took notes on the set itself. In addition to being a fun exercise, it gave me an excuse to spend some bonding time with one of my children.

My First Impressions:

My first view of the new passenger train was online. The image showed a pretty standard bullet-type passenger train with sloped ends, three cars, and a loading platform to accessorize it. I'm more of an American diesel builder, so passenger trains all sort of look alike to me. In this case, the form and components displayed reminded me of the red passenger train released a couple of years ago, while the color scheme matched the passenger train from the ill-fated "RC era" train sets.

When the review set arrived, a look at the box revealed a detail that made my heart sink. The sloped ends, one in front and one in the rear, were juniorized single-piece parts. The last passenger train that I built using parts like that was the RC version, which had a huge issue with fit. The thin cowling didn't mesh well with the other parts, leaving gaps in the body. I was curious if the updated version would have the same issue.

Gabriella's First Impressions:

When the box containing the review set arrived in the mail, Gabriella latched onto the train almost before I could remove it from the packaging. To say that I enlisted her for help with this review is a bit misleading. In reality, she begged, almost daily, to help build the train. She was very excited when I told her that she could build it herself.



Being six, she doesn't have a lot of experience with the train sets released in the past. Her first comment, after she dumped the contents of the set's box onto the floor was "This is the coolest train I've ever seen!"

Contents:

The set came packaged in a large box, showing the train and platform on the front, with a nice environmental scene combining the 2014 LEGO City sets on the back. Like the boxes of other large sets, this one came with a tabbed end, allowing it to later be used for storage. While this feature may not be important for AFOLs with large collections, it's incredibly useful for parents who need a place for their children to keep their LEGO pieces.

Parts were divided into 8 bags and a small box. Seven of the bags were numbered, corresponding to various sub-models of the set. The eighth bag contained some of the larger pieces, including the cowlings and straight track. The small box contained the PF electrical components, including the standard battery box, RC receiver and remote-control. Instruction books and a sticker sheet were well packaged with a cardboard backer and shrink-wrapped to avoid folding and bending.

The Build

Building the set was a straight forward process. Instructions were split across four books. Following Book 1, Gabriella was able to use the parts in bag 1 to build the passenger platform and crossing signals within roughly 20 minutes with no help from me. Once

complete, she immediately began playing with the minifigs and platform. From a parental view, this was a good sign. Playability when the set was just begun!

Book 2 and bags 2 and 3 were for the train's locomotive. The locomotive itself took Gabriella an hour or so to build. She needed help with the wheel-sets and the PF components, but otherwise she was able to follow the instructions and complete the model on her own. The six-stud-wide body was easily able to contain the PF battery box, and IR receiver. The on/off switch for the battery box can be triggered by a clever switch on top of the locomotive; unfortunately the roof needs to be disassembled in order to change the batteries. As a parent, I was once again struck by the number of batteries needed to run PF trains. Using rechargeable batteries is recommended if the train is going to have a lot of play time.



The front of the locomotive is mainly built using the single-piece cowl, which covers the engineer's seat and control area. Unlike the old RC train, the cowling piece fit well, snapping into place with a nice click and no gaps. Just as she did with the passenger platform, Gabriella began playing with the engineer minifig and the locomotive as soon as they were completed.

The center car of the train, using Book 3 for instructions, was made up of parts from bags 4 and 5. The main body of the car used the parts from bag 4, and took roughly 30 minutes to build. The car contains seating and tables for up to four minifigs. The interior of the car is accessed by removing the roof, the parts of which, along with the car's trucks, were in bag 5. The roof and trucks took Gabriella 10 minutes to build, for a total of 40 minutes to complete the car.

The passenger car didn't hold her interest as much as the station platform and locomotive did, but I suspect that she was beginning to lose focus, as she had been building for a couple of hours at this point. Two hours dedicated to a single task is pretty good for her. I was impressed at how well building with LEGO parts held her attention for that amount of time.

For the last car, we turned to instruction Book 4 and bags 6 and 7. My daughter built for about 20 more minutes before turning the rest of the set over to me. It took me another 10 minutes to finish the car, which mainly just needed the roof and trucks added. The interior of the car was a combination of the locomotive and center

car, containing seating and tables for four minifigs, plus a control space for the engineer to drive the train in reverse.

With the train completed, we set up the small oval of track that came with the set. For me, it was nice to see that there were a combination of curves and straight track, and no flex-track at all. Some builders have used flex-track to their advantage, but I still struggle with it personally, preferring the look of the more standard track pieces.

In the end, I lost track of the amount of time that we spent playing with the train, which, to me, is a good sign. While not targeted to advanced builders, this set is a great starter, and worked wonderfully as a father/daughter project, giving us a couple of nights of one-on-one quality time together.

As an adult builder, I'd rate the set as average. There are no special building techniques, but it's a great set for the beginning train builder. Everything needed to start a layout is included, and there is plenty of room for expansion later on.

For the child on the low-end of the set's age range, I asked Gabriella her opinion. Her answer:

"I want to keep this forever, until I grow up! Buy more trains like this! But with more cars, instead of just three. Maybe, like, nine."

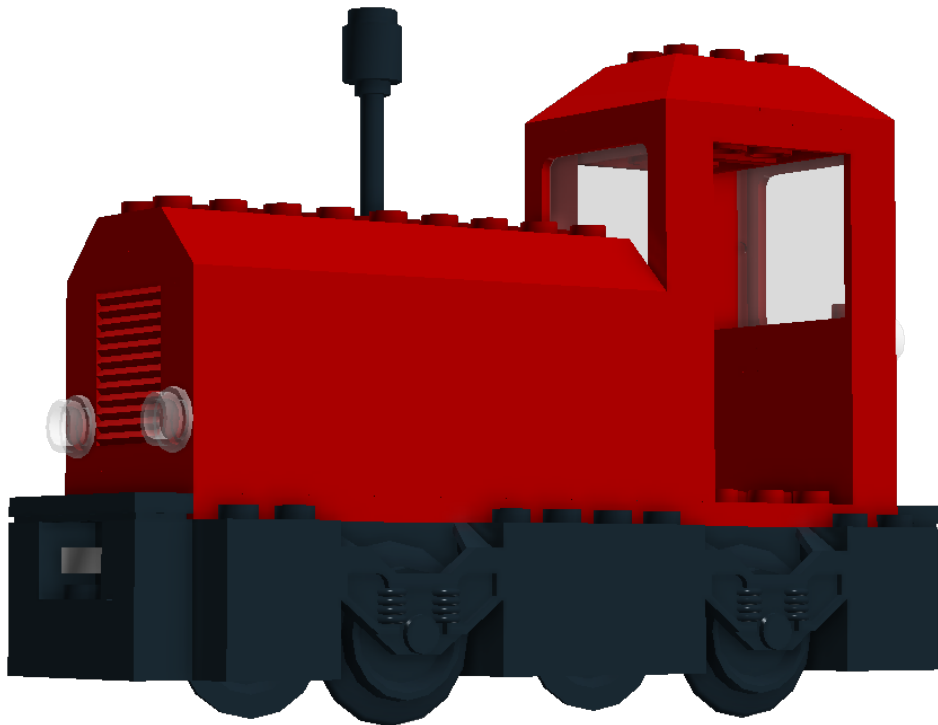
Even six-year-old rail buffs like long trains. 



Small Diesel Shunter

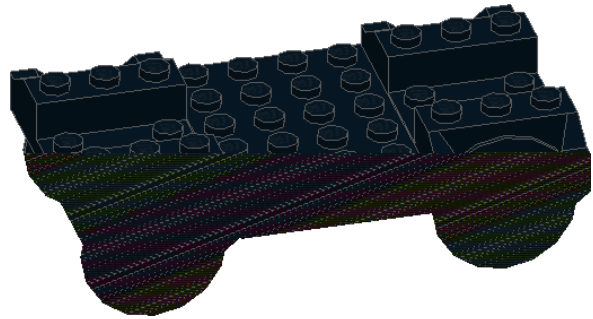
by Tille Muovinen

89 pieces



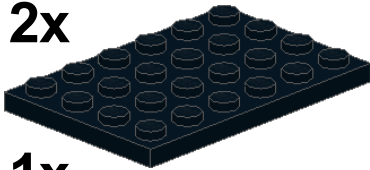
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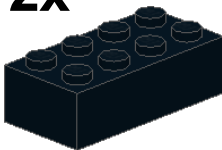
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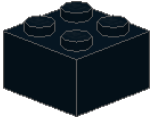
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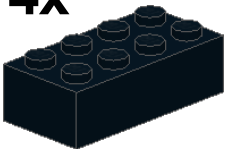
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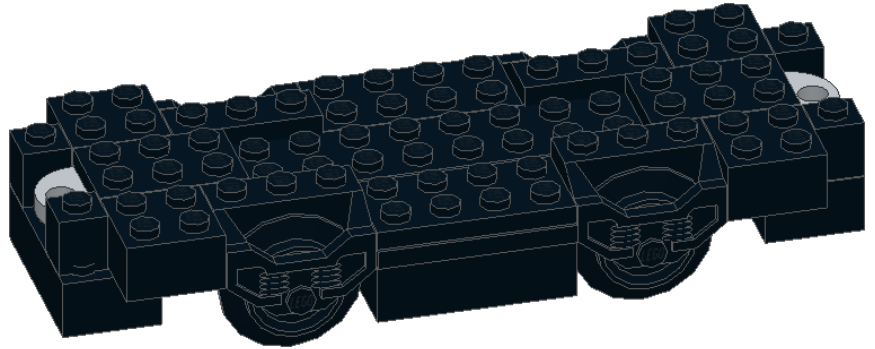
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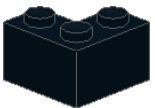
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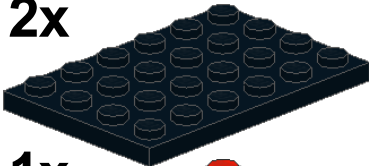
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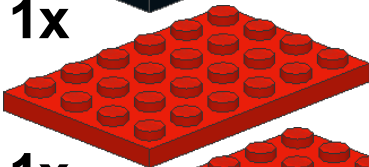
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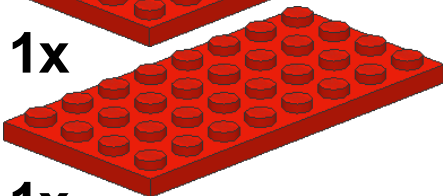
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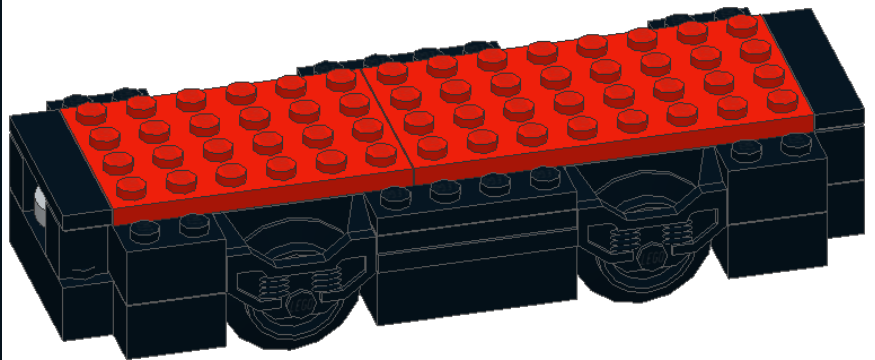
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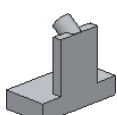
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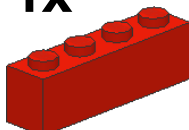
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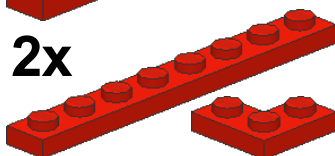
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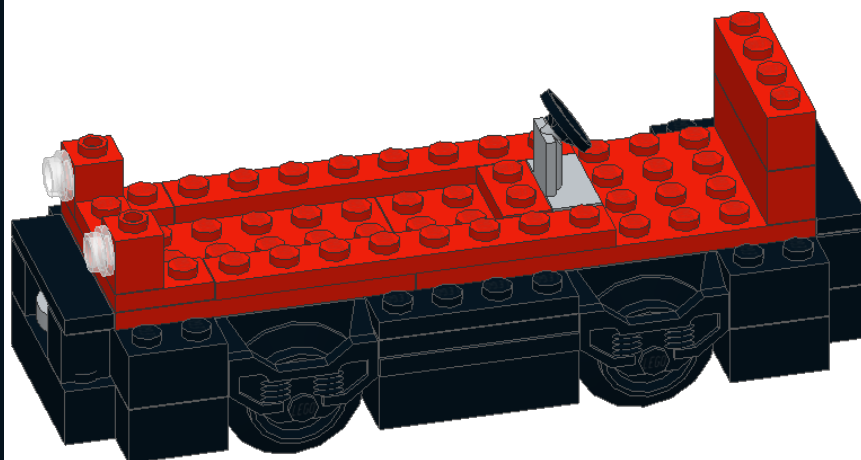
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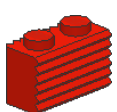
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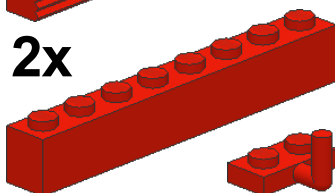
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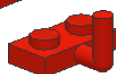
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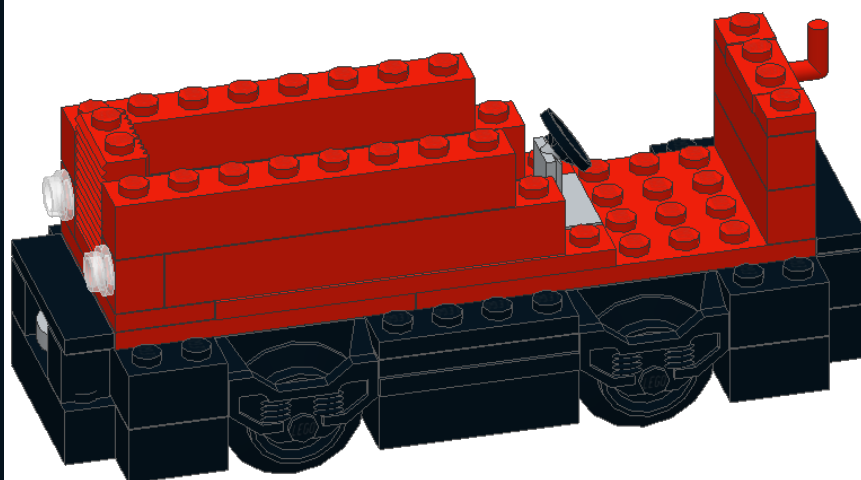
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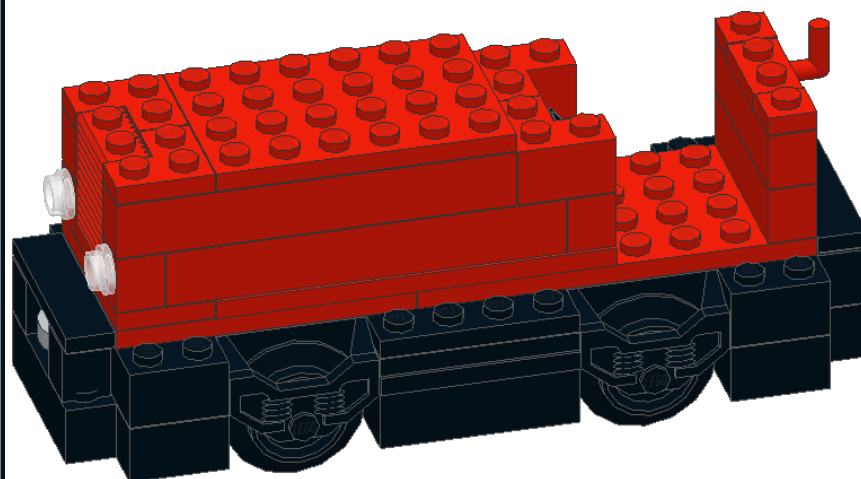
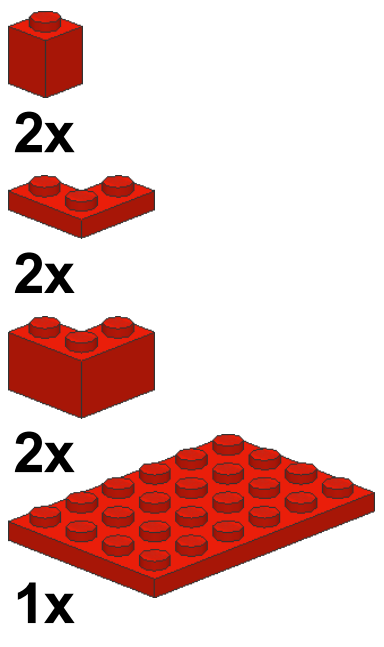
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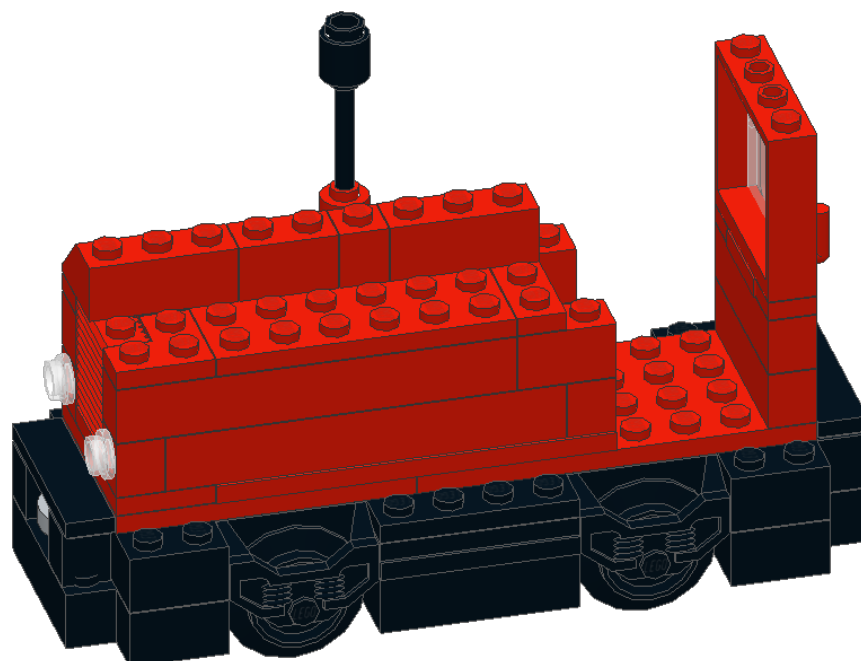
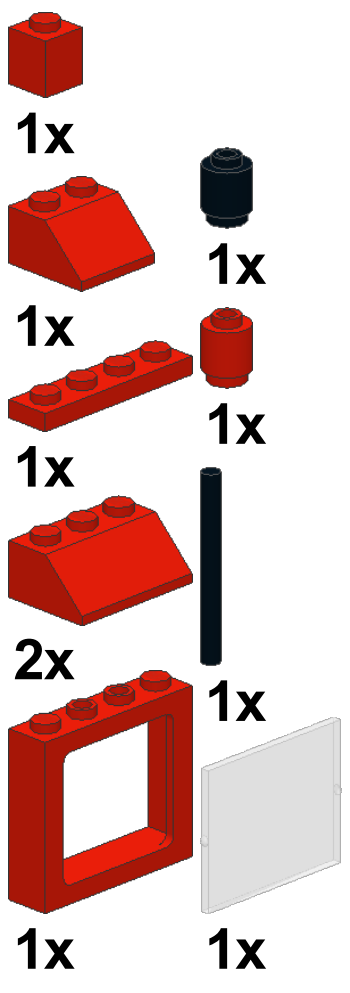
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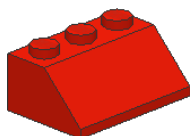
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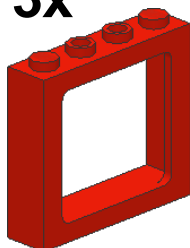
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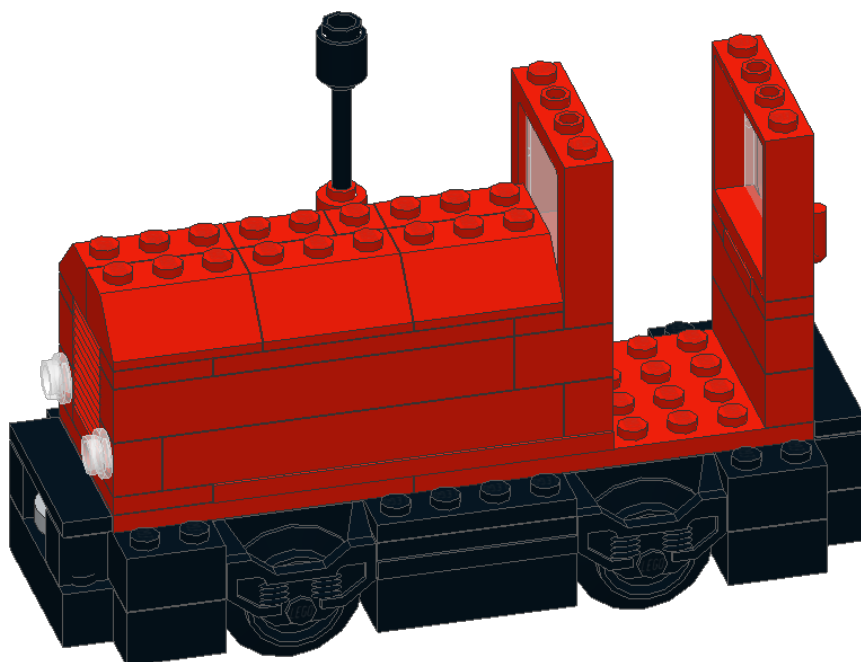
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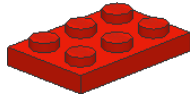
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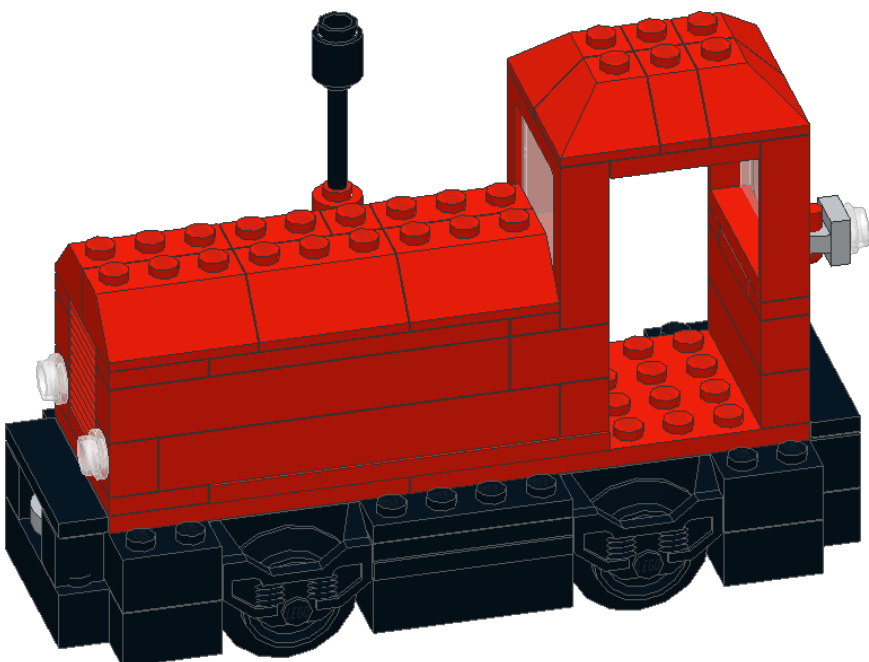
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BR23 Original Design by Reinhard "Ben" Beneke featuring BBB train wheels

